Chapter 4

Air Quality

4.1 Introduction

This chapter describes the impacts on air quality that would result from construction and operation of each of the build alternatives. The sections that follow describe the air quality study area, the methods used to analyze the impacts, the affected environment, and the impacts of the build alternatives on air quality. The regulations and guidance related to air quality are summarized in Section 4.6, *Applicable Regulations*. Appendix E, *Air Quality, Emissions, and Modeling Data*, provides further detail on the methods, emissions calculations, and the air quality modeling used to estimate ambient (outdoor) air pollutant concentrations. Chapter 5, *Greenhouse Gases and Climate Change*, provides information on greenhouse gas (GHG) emissions and climate impacts resulting from the proposed rail line. While Section 4.5.1.2, *Operation*, discusses coal dust emissions from trains and their impacts compared to the U.S. and Montana air quality standards for particulate matter, Chapter 6, *Coal Dust*, provides additional information on impacts of coal dust emissions from rail operation on human and environmental health compared to regulatory standards and guidelines other than air quality standards. Chapter 17, *Downline Impacts*, addresses air quality impacts of the proposed rail line beyond the study area. Chapter 18, *Cumulative Impacts*, addresses the contribution of the proposed rail line to cumulative impacts on air quality.

In summary, air pollutant emissions during construction would be temporary and at any given time would occur only where construction is occurring or along roads traveled by construction vehicles. Pollutant concentrations during construction are expected to remain within applicable air quality standards. Emissions during operation would differ according to the production scenario[1] and the length of each build alternative. Pollutant concentrations resulting from operational emissions would be within applicable air quality standards for all pollutants. OEA concludes that construction and operation impacts would be negligible.

4.2 Study Area

OEA defined the study area for air quality as the southeastern Montana region of Big Horn, Custer, Powder River, and Rosebud Counties, plus nearby Class I and sensitive Class II areas.[2] Notably, the Northern Cheyenne Indian Reservation, located in Big Horn and

---

[1] The coal production scenarios (low, medium, high) reflect different levels of rail traffic depending on which build alternative is licensed, which mines are developed, and the production capacities of those mines. The coal traffic scenarios are described in Appendix C, *Coal Production and Markets*, and the related rail traffic is summarized in Chapter 2, Section 2.3.3, *Rail Traffic*.

[2] This study area includes but is larger than the study area used in Tongue River III Draft Supplemental Environmental Impact Statement which was defined as "the Tongue River watershed and the part of the EPA-defined Air Quality Control Region [Region 143] containing the Tongue River and the proposed rail line."

Rosebud Counties (Figure 4-1), is a voluntary Class I area.[3] Class I and sensitive Class II areas are included because potential impacts on *air quality related values*[4] (AQRV) (resources that are affected by air pollution, such as visibility, plants and wildlife) are assessed in these areas. Section 4.6, *Applicable Regulations*, provides information on the regulations applicable to Class I and sensitive Class II areas. Regulatory requirements for Class I areas are more restrictive than for Class II areas, which include all non-Class I areas. Although not mentioned in the Clean Air Act, sensitive Class II areas include areas for which state, tribal, or federal agencies request additional air quality and AQRV protection. This air quality and AQRV analysis assesses impacts on sensitive Class II areas using Class I thresholds to ensure the analysis does not underestimate impacts. Potential impacts on *criteria pollutant* concentrations relative to the National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards (Montana AAQS) would be negligible beyond the immediate vicinity (less than 1 kilometer) of the rail line right-of-way, so detailed air quality modeling for the NAAQS assessment is limited to this smaller portion of the study area.

---

[3] Voluntary Class I areas are Class I areas that are not named as mandatory Class I areas in the Clean Air Act but were designated at the request of the jurisdiction (in this case, the Northern Cheyenne Tribe).

[4] Terms italicized at first use are defined in Chapter 25, *Glossary*.

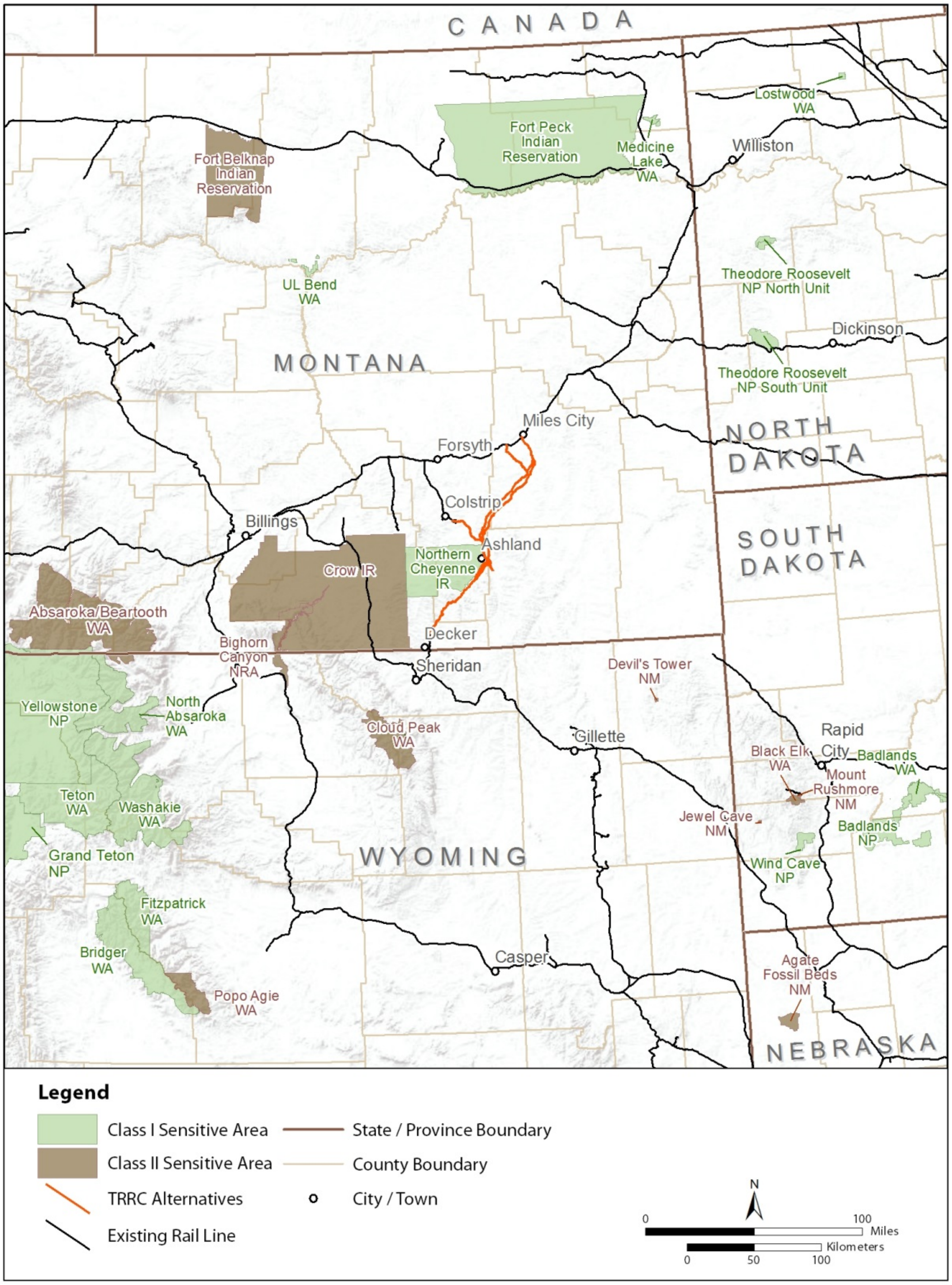

Figure 4-1. Class I and Class II Sensitive Areas

4.3 Analysis Methods

OEA used the following steps to evaluate the air quality impacts of air emissions related to construction and operation of the build alternatives. OEA consulted with the U.S. Environmental Protection Agency (USEPA) regarding its approach to the analysis.

- OEA identified and characterized the emission sources resulting from construction and operation of the proposed rail line.
- OEA calculated the emissions from each emission source and aggregated the emissions to estimate total emissions for rail line construction and total emissions per year for rail line operation for each air pollutant. OEA used the following references, methods, data, and models to estimate emissions.
    - USEPA NONROAD2008a (U.S. Environmental Protection Agency 2009a) model to estimate emission rates from construction equipment.
    - USEPA MOVES2010b (U.S. Environmental Protection Agency 2010) model to estimate emission rates from motor vehicles traveling on roads and delayed at roadway-rail grade crossings.
    - USEPA (2009b) guidance to estimate exhaust emission rates from locomotives. USEPA emissions standards for locomotives become more restrictive over time. The emissions averaged over all locomotives in a fleet will decrease over time as newer locomotives subject to lower (more restrictive) emission standards enter the fleet and older locomotives retire.
    - Equations developed by Queensland Rail (2008) based on testing by Witt *et al.* (1999) to estimate coal dust particulate matter emissions from trains (Chapter 6, *Coal Dust*, provides additional information about the impacts of coal dust emissions from rail operation on human and environmental health).
    - Western Region Air Partnership (2006) guidance and the USEPA AP-42 emission factor compilation (U.S. Environmental Protection Agency 1998a, 1998b, 2006) to estimate emissions of fugitive particulate matter from earthmoving and exposed earth surfaces. (*Fugitive emissions* are emissions that are not emitted from a stack, vent, or other specific point that controls the discharge. For example, windblown dust is fugitive particulate matter.)
    - Soil mapping data by Wind Erodibility Group (U.S. Department of Agriculture 2014) and testing by Haines et al. (2001) to estimate emissions of fugitive particulate matter from wind erosion of exposed earth surfaces within the right-of-way during rail operation.
- OEA used the USEPA AERMOD version 13350 dispersion model (U.S. Environmental Protection Agency 2004) with the estimated emission rates, along with meteorological data for the study area, to estimate the concentrations of airborne pollutants and the deposition of particulate matter that could result from operation of the proposed rail line.

Appendix E, *Air Quality, Emissions, and Modeling Data*, contains further details on the concentration and deposition modeling.

- OEA compared the increases in emissions of criteria pollutants and *hazardous air pollutants* (HAPs) with existing emission levels in the study area and the State of Montana. OEA also compared the estimated concentrations of criteria pollutants, changes in visibility, and changes in *acid deposition* with the applicable standards and thresholds.

4.4 Affected Environment

The existing environmental conditions related to air quality in the study area are described below.

4.4.1 Meteorology

The temperature and precipitation of the study area are typical of a semiarid climate. The study area is in the rain shadow of the Rocky Mountains and is characterized as a semiarid continental regime of the Great Plains grasslands (Bureau of Land Management 2013). Precipitation varies considerably from month to month. Mean annual precipitation ranges from about 12 inches at the lower elevations to 16 inches at the higher elevations. Approximately half of all annual precipitation occurs from April to June, largely as thunderstorms, while late summer is the driest period (Western Region Climate Center 2014a). Wide annual temperature variations are typical for the region. Table 4-1 shows precipitation, temperature, and wind data for representative locations in the study area.

Table 4-1. Precipitation and Temperature for the Study Area

Description	Statistic	Birney	Colstrip	Decker	Miles City
Precipitation (inches)	Annual average	13.16	15.09	11.98	13.33
Temperature (°F)	Monthly average minimum (month of occurrence)	4.9 (Jan)	9.6 (Jan)	-2.0 (Jan)	7.0 (Jan)
	Monthly average maximum (month of occurrence)	89.5 (Jul)	88.1 (Jul)	89.3 (Jul)	89.0 (Jul)
	Annual average	45.6	46.2	42.7	46.7
Wind speed (mph)	Annual average	5.1	No data	No data	9.9

Notes:
Source: Western Region Climate Center 2014a, 2014b
°F = degrees Fahrenheit; mph = miles per hour

Winds in the Tongue River Valley tend to blow from the northwest in autumn and winter, from the west in spring, and from the southwest in summer. Near the Tongue River, winds are influenced by the topography of the Tongue River Valley. Wind speeds are generally moderate, averaging 6 miles per hour (mph) (U.S. Environmental Protection Agency 2014a).

The only weather monitoring stations near the study area are in Birney and Miles City. The monitoring station at Birney, operated by the Montana Department of Environmental Quality (Montana DEQ), is the more representative meteorological station for almost the entire extent of the study area because of the monitor's location within the Tongue River Valley and the general southwest-to-northeast orientation of the valley, which includes most of the length of the proposed rail alignments. Wind directions predominantly are from the southwest and northeast, consistent with the topography of the Tongue River Valley. Appendix E, *Air Quality, Emissions, and Modeling Data*, Figure E-2, shows a wind rose plot that displays the wind direction and speed pattern in detail. The average wind speed at Birney (2.3 meters per second, about 5.1 mph) is lower than at Miles City (4.4 meters per second, about 9.9 mph). Use of the lower wind speed at Birney results in a more conservative analysis (higher pollutant concentrations) than the higher wind speed at Miles City. Accordingly, OEA used the data from the Birney station for the air quality analysis.

Mixing heights (the elevations at which all air quality constituents are thoroughly mixed) in the Tongue River region are highest in the afternoon and lowest at night when cooling results in stable air, inhibiting air pollutant mixing and enhancing pollutant transport along the valley air drainages (Bureau of Land Management 2013).

Wind speeds and mixing heights are important in determining air pollutant dispersion because lower wind speeds or lower mixing heights lead to lower dispersion rates; higher wind speeds or higher mixing heights lead to higher dispersion rates.

4.4.2 Ambient Air Quality

4.4.2.1 Overview

Ambient air quality refers to the quality of outdoor air. Existing ambient air quality conditions in the study area are generally considered good, although higher than normal air pollutant concentrations have occurred around existing coal mines and populated areas. Air pollution in the Tongue River Valley currently emanates from a variety of sources: coal strip mines, agricultural operations, electrical power generation, wood-waste burning, home heating, vehicle traffic on unpaved roads, and wind erosion from exposed soil areas. Heavy equipment at coal strip mines is a source of combustion-related emissions. All of these sources produce emissions of various pollutants (Bureau of Land Management 2013).

The NAAQS and Montana AAQS are summarized in Table 4-2.

Table 4-2. National and Montana Ambient Air Quality Standards

Pollutant	Jurisdiction	Federal Standard Type	Averaging Period	Standard Value
Carbon monoxide	Federal	Primary	1-hour average	35 ppm (40 mg/m^3)
	Montana	–	1-hour average	23 ppm (26 mg/m^3)
	Federal and Montana	Primary	8-hour average	9 ppm (10 mg/m^3)
Fluoride in foliage	Montana	–	Monthly average	50 µg/g
	Montana	–	Grazing season average	35 µg/g
Hydrogen Sulfide	Montana	–	1-hour average	0.05 ppm
Lead	Montana	–	90-day average	1.5 µg/m^3
	Federal	Primary and Secondary	Rolling 3-month average	0.15 µg/m^3
Nitrogen dioxide	Federal	Primary	1-hour average	100 ppb (188 µg/m^3)
	Montana	–	1-hour average	300 ppb (564 µg/m^3)
	Federal and Montana	Primary and Secondary	Annual average	53 ppb (100 µg/m^3)
Ozone	Montana	–	1-hour average	0.10 ppm
	Federal	Primary and Secondary	8-hour average	0.075 ppm
Particulate matter (PM10)	Federal and Montana	Primary and Secondary	24-hour average	150 µg/m^3
	Montana	–	Annual average	50 µg/m^3
Particulate matter (PM2.5)	Federal	Primary and Secondary	24-hour average	35 µg/m^3
	Federal	Primary	Annual average	12 µg/m^3
	Federal	Secondary	Annual average	15 µg/m^3
Settled particulate matter	Montana	–	30-day average	10 g/m^2
Sulfur dioxide	Federal	Primary	1-hour average	0.075 ppm (196 µg/m^3)
	Montana	–	1-hour average	0.5 ppm (1300 µg/m^3)
	Federal	Secondary	3-hour average	0.5 ppm (1300 µg/m^3)
	Montana	–	24-hour average	0.1 ppm (260 µg/m^3)
	Montana	–	Annual average	0.02 ppm (52 µg/m^3)
Visibility[a]	Montana	–	Annual average	3 × 10^{-5} per meter

Notes:

[a] Applicable only in Class I areas as designated under the Montana Clean Air Act rules, Prevention of Significant Deterioration of Air Quality, (ARM 17.8.8)

Sources: 40 C.F.R. Part 50; 17 ARM 8.220

ppm = parts per million; ppb = parts per billion; mg/m^3 = milligrams per cubic meter; µg/m^3 = micrograms per cubic meter; g/m^2 = grams per square meter; µg/g = micrograms per gram; per meter (inverse meter) = unit of light extinction (how much light is absorbed or scattered as it passes through the atmosphere). The higher the value, the hazier the air is. The Montana visibility standard corresponds to a visual range of about 130 km (80 miles). C.F.R. = Code of Federal Regulations; ARM = Administrative Rules of Montana

Air pollutant levels in southeastern Montana are well within these standards, and the study area is designated *attainment* (meets the NAAQS) except for part of the community of Lame

Deer. In December 1990, USEPA classified a part of Lame Deer as a moderate nonattainment area for particulate matter 10 microns or less in diameter (PM10). Monitoring in the Lame Deer area indicates that airborne dust from unpaved roads is the primary cause of noncompliance with the federal and state PM10 standards. Lame Deer is located in the Northern Cheyenne Reservation, designated by USEPA as a voluntary Class I area, sensitive to increases in air pollutants. USEPA has designated all other areas in the Tongue River Valley as either attaining the NAAQS or as unclassified. (USEPA treats unclassified areas as attainment.) None of the build alternatives would pass through Lame Deer or the Northern Cheyenne Reservation.

4.4.2.2 Measured Concentrations

Montana DEQ conducts ambient air quality monitoring in the Tongue River Valley and requires some coal mines and power plants in the area to monitor air quality near their facilities. Monitoring data from coal mines and power plants can provide indications of air quality conditions near those facilities and similar facilities. Ambient air quality measurements are available from monitoring sites at the Spring Creek, Decker, and Rosebud Mines. Because these monitors are located at sites that are influenced by emissions from the nearby mine facility, measurements recorded are likely to be higher than conditions in the study area in general. Montana DEQ also maintains a monitoring site at Birney that measures nitrogen dioxide (NO_2), ozone, PM10, and particulate matter 2.5 microns or less in diameter (PM2.5).

Rosebud Mine

The Rosebud Mine operated an ambient PM10 air quality monitoring system until 2001. Prior to granting the mine's request to discontinue the monitoring program, Montana DEQ reviewed the PM10 data collected at Rosebud Mine's seven monitoring sites from 1992 through 2000. During this period, the annual PM10 averages at all sites were less than 28 percent of the Montana annual standard (50 $\mu g/m^3$). For the 24-hour concentrations, all of the annual maximum 24-hour values were less than 53 percent of the federal and Montana 24-hour standard (Montana Department of Environmental Quality 2001a and 2001b).

Coal production from 1983 through 2012 at the Rosebud Mine averaged 11.7 million tons per year, with a high production of 13.4 million tons in 2005. Production at this mine averaged 11.1 million tons per year during the monitoring period of 1992 to 2000 (U.S. Energy Information Administration 2014). Ambient air quality monitoring data from the Rosebud Mine indicate that PM10 concentrations in the area influenced by mine operations were within the NAAQS and Montana AAQS. Based on these coal production levels, ambient PM10 concentrations from 1992 through 2000 should be similar to concentrations from 2001 through 2012 and thus representative of current and projected mine activity (Montana Department of Environmental Quality 2013).

Spring Creek Mine

The Spring Creek Mine operated a PM10 air quality monitoring program in accordance with the facility air permit until 2009 (Montana Department of Environmental Quality 2009). PM10 measurements conducted from 1992 through 1993 recorded an average annual PM10 concentration of 13 micrograms per cubic meter ($\mu g/m^3$), well below the Montana annual average standard of 50 $\mu g/m^3$ (Surface Transportation Board 2004). In a letter dated September 8, 2009, Montana DEQ determined that the Spring Creek Mine could discontinue ambient monitoring of PM10 because it had had relatively low readings since 2004 (Montana Department of Environmental Quality 2012a). Ambient air quality monitoring data from the Spring Creek Mine from 2004 to 2009 indicated that PM10 concentrations in the area influenced by Spring Creek Mine operations were within the NAAQS and Montana AAQS.

Decker Mine

The Decker Mine operates an ambient air quality monitoring program in accordance with permit conditions in Permit 1435-07. The Decker Mine is required to operate and maintain five PM10 air monitoring sites and one meteorological data monitoring site near the mine and facilities. Locations of the monitoring sites are described in Attachment 1 of Permit 1435-07 (Montana Department of Environmental Quality 2012b). The annual PM10 mean values over the most recent 6 years of available data (2007 to 2012) ranged from 10 to 34 $\mu g/m^3$, or about 20 to 68 percent of the Montana annual standard of 50 $\mu g/m^3$. During the same period, the maximum 24-hour concentrations ranged from 27 to 139 $\mu g/m^3$, or about 18 to 93 percent of the 24-hour NAAQS and Montana AAQS of 150 $\mu g/m^3$ (Montana Department of Environmental Quality 2012b). Ambient air quality monitoring data from the Decker Mine indicate that PM10 concentrations in the area influenced by mine operations are within the NAAQS and Montana AAQS.

Birney-Tongue River

Montana DEQ has measured PM10, PM2.5, ozone, and NO_2 since 2010 at a monitoring site in Birney. The Birney-Tongue River monitoring site is located in the Tongue River Valley about 3 miles north of Birney and about 11 miles southwest of the proposed Terminus 1. DEQ established this site to determine the current levels of a variety of air pollutants and to track changes in air quality that may occur due to coal bed natural gas development. Table 4-3 summarizes the most recent 3 years of data at the Birney monitoring station. These measured levels generally are representative of the study area except for PM10. The PM10 concentrations measured at Birney are highly influenced by dust emissions due to traffic on unpaved roads near the monitoring station, and because of this dust, the measured concentrations are higher than typical background levels of PM10 in the study area (Montana Department of Environmental Quality 2012c). Concentrations of all pollutants measured at the Birney-Tongue River site are within the NAAQS and Montana AAQS.

Table 4-3. Measured Pollutant Concentrations at Birney Monitor

Pollutant (unit)	Averaging Period	2011	2012	2013	3-year Mean
NO_2 (ppb)	Annual average[a]	1.6	1.9	1.6	n.a.
	Maximum 1-hr average[b]	7.0	7.8	6.0	6.9
O_3 (ppm)	Maximum 8-hr average[c]	0.052	0.059	0.056	0.056
PM2.5 (μg/m^3)	Annual average[d]	5.2	7.8	4.0	5.7
	Maximum 24-hr average[e]	16.3	28.6	10.9	18.6
PM10 (μg/m^3)	Maximum 24-hr average[f]	65.0	86.0	59.0	70.0
	Annual average (MT standard only)	15.9	23.2	16.4	18.5

Notes:

[a] NO_2 data given as the annual mean of hourly readings. NAAQS attainment is demonstrated if the annual average is less than the standard value.

[b] NO_2 1-hour average is calculated as the 98th percentile, averaged over 3 years. NAAQS attainment is demonstrated if the 3-year annual average of the 98th percentiles is less than the standard value.

[c] O_3 data are given as the 4th highest 8-hour average for the reporting year. NAAQS attainment is demonstrated if the 3-year mean of the 4th highest 8-hour averages is less than the standard value.

[d] PM2.5 annual data are given as the annual mean. NAAQS attainment is demonstrated when the 3-year average of the annual mean is less than the standard value.

[e] PM2.5 24-hour average is calculated as the 98th percentile, averaged over 3 years. NAAQS attainment is demonstrated if the 3-year annual average of the 98th percentiles is less than the standard value.

[f] PM10 not to be exceeded more than once per year on average over 3 years. The table shows second highest recorded value for each monitored year.

Source: U.S. Environmental Protection Agency 2014a

NO_2 = nitrogen dioxide; ppb = parts per billion; O_3 = ozone; ppm = parts per million; PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards

4.4.2.3 Visibility

Monitors in the nationwide federal Interagency Monitoring of Protected Visual Environments (IMPROVE)[5] network provide information on current visibility levels and trends in visibility[6]. The nearest IMPROVE monitor to the study area is located on the Northern Cheyenne Indian Reservation. Data from this monitor indicate that visibility in the study area has remained constant over the last 10 years (Colorado State University 2014). From 2003 through 2013, the average visible range at the Northern Cheyenne IMPROVE monitor was 57 miles (corresponding to about 14.5 *deciviews*, a measurement of visibility) during the haziest 20 percent of days and 171 miles (corresponding to about 3.5 deciviews) during the clearest 20 percent of days. Compared with the Montana visibility standard of 80 miles, visibility at the Northern Cheyenne IMPROVE monitor was less than the visibility standard during the haziest 20 percent of days and greater than the visibility standard during the clearest 20 percent of days.

---

[5] The IMPROVE program is a cooperative measurement effort governed by a steering committee composed of representatives from federal and regional-state organizations. The IMPROVE monitoring program was established in 1985 to aid the creation of federal and state implementation plans for the protection of visibility in Class I areas (156 national parks and wilderness areas) as stipulated in the 1977 amendments to the Clean Air Act.

[6] Visibility impacts occur when emissions absorb and scatter light in the atmosphere, causing haze and reducing the clarity of views. Regional haze impairs visibility and is produced by emissions from numerous sources located across broad geographic areas. Visibility levels are expressed as a percent increase in light extinction (reduced visibility) compared to a presumed pristine background, or as a visual range in miles.

4.4.2.4 Acid Deposition

Acid deposition is a result of emissions of sulfur oxides (SO_x) and nitrogen oxides (NO_x) which in the atmosphere are converted to sulfuric acid and nitric acid, respectively. Monitors in the Clean Air Status and Trends Network (CASTNET)[7] provide information on current acid deposition levels and trends in deposition. The CASTNET deposition monitor with available air quality trend data nearest to the study area is located at Theodore Roosevelt National Park, North Dakota. This site is located approximately 120 miles northeast of Miles City. The atmospheric conversion of SOx and NOx takes hours to days during which time the pollutants can travel a considerable distance while mixing with the surrounding air. As a result, rates of acid deposition show relatively little spatial variation and measurements at one location are representative of a broader regional scale. Accordingly, measurements by the CASTNET monitor at Theodore Roosevelt National Park are considered representative of the study area. Data from this monitor indicate that from 2003 through 2013, total sulfur deposition followed a declining trend, averaging 1.1 kilograms per hectare (kg/ha) for this period (U.S. Environmental Protection Agency 2014b). Total nitrogen deposition also followed a declining trend, averaging 2.8 kg/ha for this period. These deposition rates are less than the significance thresholds of 5 kg/ha per year of sulfur compounds and 3 kg/ha per year of nitrogen compounds commonly applied by Federal land management agencies (Bureau of Land Management 2013).

4.4.3 Existing Emissions in the Study Area

Table 4-4 shows existing levels of emissions from all sources in the study area (Big Horn, Custer, Powder River, and Rosebud Counties) and for the state of Montana for 2011, the most recent year of data available (U.S. Environmental Protection Agency 2013). The USEPA (2013) data indicate that for many pollutants, wildfires and prescribed fires (intentional fires under vegetation management programs) contribute the largest proportion of emissions in the study area. For acetaldehyde, formaldehyde, and volatile organic compounds (VOCs), biogenic sources (vegetation and soil) contribute the largest share of total emissions. For ethyl benzene and xylene, gasoline-fueled vehicles and equipment contribute the largest share of total emissions. For NO_X and SO_X, the largest contributor is coal-fired electricity generation. For PM10, the largest contributors are wildfires, unpaved road dust, and mining. For PM2.5, wildfires, prescribed fires, coal-fired electricity generation, and mining are the largest contributors in the study area.

---

[7] CASTNET monitoring sites are operated by the U. S. Environmental Protection Agency, the National Park Service, and the Bureau of Land Management. The sites provide long-term monitoring of air quality in rural areas to determine trends in regional atmospheric nitrogen, sulfur, and ozone concentrations and deposition fluxes of sulfur and nitrogen pollutants in order to evaluate the effectiveness of national and regional air pollution control programs.

Table 4-4. Existing Emissions in Montana and in the Study Area

	Emissions in 2011 (tons/year)[a]	
Pollutant	**Four-County Area[b]**	**Montana Statewide**
Criteria Pollutants		
Carbon monoxide	460,261	1,525,705
Nitrogen oxides	31,761	161,105
PM10	71,629	437,051
PM2.5	40,655	141,519
Sulfur dioxide	15,260	29,358
Volatile organic compounds (ozone precursors)	243,952	1,456,678
Lead	0.46	5.40
Hazardous Air Pollutants		
1,3-Butadiene	514	1,490
Acetaldehyde	2,997	25,944
Acrolein	537	1,464
Benzene	1,471	4,888
Ethylbenzene	20	414
Formaldehyde	6,672	42,624
Hexane	62	1,040
Toluene	887	5,840
Xylene	86	1,708

Notes:

[a] Criteria pollutant emissions except for lead are shown to the nearest ton as reported by USEPA (2013). Reported lead emissions have been rounded to the nearest 0.01 ton. Reported HAP emissions have been rounded to the nearest ton.

[b] Consists of Big Horn, Custer, Powder River, and Rosebud Counties

Source: U.S. Environmental Protection Agency 2013

4.5 Environmental Consequences

Impacts on air quality could result from construction and operation of any build alternative. The impacts common to all build alternatives are presented first, followed by impacts specific to the build alternatives. For further details, see Appendix E, *Air Quality*, *Emissions, and Modeling Data.*

4.5.1 Impacts Common to All Build Alternatives

The impacts on air quality that are common to all build alternatives are described in this section. Impacts on visibility and acid deposition in the context of AQRVs are assessed in a much larger geographic context, and are addressed in Chapter 18, *Cumulative Impacts*, and Appendix U, *Cumulative Impacts*. Chapter 5, *Greenhouse Gases and Climate Change*, addresses the impacts of air emissions on climate change and biological adaptation. Chapter 6, *Coal Dust*, addresses the impacts of coal dust emissions from rail cars on humans and the environment.

4.5.1.1 Construction

Pollutant emissions from construction would be common to all build alternatives, but would differ in degree for each build alternative depending on the amount of earth disturbance, construction equipment, and vehicle usage required. The construction schedule is outlined in Chapter 2, Section 2.2.9, *Construction Schedule*.

- **Affect Ambient Air Quality with Emissions from Construction Equipment and Activities**

  Exhaust emissions would result from construction equipment, trucks, and workers' personal vehicles. Fugitive particulate matter would result from excavation, earthmoving, vehicle and equipment travel over unpaved roads and surfaces, and erosion of exposed earth or materials surfaces by the wind. Estimated rates of fugitive emissions take into consideration the use of watering during construction to limit fugitive particulate matter emissions. Construction emissions would be temporary and at any given time would occur only where construction is occurring or along roads traveled by construction vehicles. The effects of construction emissions on ambient air quality would vary with time due to the construction schedule, the mobility of the emission sources, the types of equipment in use, and local meteorology. Construction is not anticipated to lead to pollutant concentrations that would violate the NAAQS or Montana AAQS. Appendix E, *Air Quality, Emissions, and Modeling Data,* provides further detail on the construction emissions calculations.

4.5.1.2 Operation

Operation of any build alternative would result in exhaust emissions from locomotives and vehicles delayed at road/rail grade crossings, coal dust emissions from rail cars, and fugitive particulate matter from erosion of newly exposed, nonvegetated earth surfaces by the wind. Particulate matter is the only pollutant that would be emitted from emission sources other than exhaust from locomotives and delayed vehicles. The total emission of PM10 or PM2.5 is the sum of emissions from locomotive exhaust, coal dust, and wind erosion. As described below, the total particulate matter emissions would reflect the variations in coal dust emissions by year and production scenario. Emissions estimated for the Colstrip Alternatives include the project-related train operation on the Colstrip Subdivision.

- **Contribute to Locomotive Exhaust Emissions**

  Operation of any build alternative would affect air quality by contributing locomotive exhaust emissions. The impact of locomotive exhaust would vary depending on the volume of train traffic and the track mileage, both of which are a function of the coal production scenario and the specific build alternative. The average exhaust emissions per ton-mile for locomotives in the BNSF Railway Company (BNSF) fleet will decrease over time because the USEPA emissions standards for locomotives become more restrictive over time. Newer locomotives subject to lower emission standards will enter the fleet and older locomotives will be retired. The decrease of exhaust emissions will vary by pollutant. If coal production levels increase at the potentially induced Poker Jim Creek–O'Dell Creek and Canyon Creek Mines, then rail traffic would increase, and the total emissions could decrease or increase over time depending on the relative sizes of the emission rate decrease and the rail traffic increase. The high, medium, and low coal production scenarios, discussed in Chapter 2, Section 2.3.3, *Rail Traffic*, are associated with different levels of rail traffic.

The total emissions for the medium and high production scenarios reflect the increased rail traffic and lower locomotive emissions. Because the decreases in locomotive emission rates vary by pollutant, the years in which the peak emissions would occur also vary by pollutant. The total emissions would be highest with the high production scenario and lowest with the medium and low production scenarios. Based on the estimated timing of the production increases in the coal production scenarios, emissions were evaluated for 2018, 2023, 2030, and 2037.

Locomotive emissions from operation of build alternative, as described in Section 4.5.2, *Impacts by Build Alternative,* would be small relative to existing emissions in Montana and the four-county study area (Table 4-4, *Existing Emissions in Montana and the Study Area*). Pollutant concentrations resulting from locomotive emissions would not be expected to exceed the NAAQS or Montana AAQS.

- **Contribute to Coal Dust Emissions from Rail Cars**

  Operation of build alternative would result in coal dust emissions from rail cars. The amount of coal dust emissions would vary depending on the volume of train traffic and the track mileage, a function of the coal production scenario and the build alternative. Three main sources contribute to coal dust emissions from rail cars.

  - Coal dust blown from the top of the rail cars by the air moving over the loaded, uncovered rail cars. This is the principal source of airborne coal dust.
  - Spillage or leakage of coal dust from rail car doors, sills, couplings, shear plates, and bogies (wheel assemblies). This spilled coal (also known as *parasitic load*) can become airborne due to the vibrations of the rail car while the train is moving.
  - Residual coal dust left in unloaded rail cars that is blown by air moving over and into the rail car.

  Emissions of coal dust particulate matter would be greater than emissions of locomotive exhaust particulate matter. Coal dust particulate matter emissions vary with total train mileage (the number of trains multiplied by the distance traveled per train) and, therefore, would vary with production scenario and length of the build alternative. Coal dust particulate matter emissions would be constant for all years with the low production scenario, highest from 2023 to 2037 with the medium production scenario, and highest from 2023 to 2037 (northern alternatives)[8] and 2030 to 2037 (southern alternatives) with the high production scenario. Consistent with a BNSF tariff for coal shippers, if the Board licenses a build alternative, TRRC (and BNSF, the rail line operator) would require the control of coal dust emissions by shaping the load profile and using *topper agents* (coatings applied to the coal pile in the rail car after loading) or other means acceptable under the tariff. Appendix E, *Air Quality, Emissions, and Modeling Data,* provides the details of the emissions calculations. Further details on coal dust emissions from rail cars are provided in Chapter 6, *Coal Dust*. As discussed below, concentrations of PM10 and PM2.5 due to coal dust emissions would not be expected to exceed the NAAQS or Montana AAQS.

- **Contribute to Particulate Matter Emissions from Wind Erosion**

  Operation of any build alternative would affect air quality due to particulate matter emissions from wind action on newly exposed, unstabilized earth surfaces. This erosion would continue to occur in the right-of-way during operation of the proposed rail line. The level of the impact would depend on the amount of erodible soil types exposed and local meteorology, as well as the track mileage. Appendix E, *Air Quality, Emissions, and Modeling Data*, provides the details of the wind erosion emissions calculations. Concentrations of PM10 and PM2.5 due to wind erosion would not be expected to exceed the NAAQS or Montana AAQS.

- **Contribute to Exhaust Emissions from Motor Vehicles Delayed at Grade Crossings**

  Operation of any build alternative would contribute vehicle exhaust emissions from vehicles that are delayed at grade crossings. OEA estimated the increase in vehicle exhaust emissions associated with the vehicle delays based on the estimated delays discussed in Chapter 3, Section 3.3, *Grade-Crossing Delay.* The estimated increase in vehicle exhaust emissions associated with idling vehicles delayed at grade crossings, summed over all crossings of the right-of-way, would be less than 0.09 ton per year of any criteria pollutant for the build alternative and coal production scenario having the highest estimated vehicle exhaust emissions resulting from grade-crossing delays. As a result, OEA concluded that the estimated increase in vehicle exhaust emissions from idling vehicles delayed at grade crossings with any build alternative would be small and would not have a substantial impact on air quality. Appendix E, *Air Quality, Emissions, and Modeling Data*, provides additional detail on the vehicle exhaust emissions calculations for vehicles delayed at grade crossings.

---

[8] The northern alternatives are the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives. The southern alternatives are the Decker Alternatives.

- **Contribute to Air Pollutant Concentrations from All Emission Sources**

  Operation of any build alternative would contribute locomotive exhaust emissions. OEA assessed the emissions of all criteria pollutants from the high coal production scenario, southern alternatives, which would operate 26.7 trains per day and produce the most emissions. The air quality modeling shows that, of all criteria pollutants, the pollutant concentration estimated to reach the largest percentage of its respective standard is 1-hour NO_2. The year in which maximum emissions of NO_X would be anticipated to occur is 2030. Table 4-5 shows the modeled concentrations for 2030.

  Table 4-5 also shows the modeled concentrations of CO, lead, PM10, PM2.5, and SO_2, and the annual average NO_2 concentration from all sources. All modeled concentrations are below the NAAQS. The low and medium coal production scenario models show lower concentrations for these pollutants. All concentrations of CO, lead, PM10, PM2.5, SO_2, and annual average NO_2 would be below the NAAQS and Montana AAQS.

  As with NO_X, the maximum emissions of CO, PM10, PM2.5, and SO_2 would occur in 2030 (emissions of CO and SO_2 are estimated to be the same in 2030 and 2037). The model results show that there would be no violations of the NAAQS or Montana AAQS for PM10, PM2.5, CO, SO_2, or annual average NO_2 in any analysis year. Additional results for all three production levels for the 4 years analyzed, as well as further details on the dispersion modeling, are presented in Appendix E, *Air Quality, Emissions, and Modeling Data.*

Table 4-5. Modelled Maximum Air Pollutant Concentrations, Southern Alternatives, 2030, High Production Scenario (26.7 trains per day)

Pollutant	Averaging Period	Form[a]	Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS or Montana Standard[b] ($\mu g/m^3$)	Total Concentration Percentage of NAAQS or Montana Standard (%)
Carbon monoxide	1-hour	H2H	194	7,213 [c]	7,407	26,450	28
	8-hour	H2H	66	2,175 [c]	2,241	10,000	22
Lead	Quarterly	H1H	0.0001	0.0005 [d]	0.0006	0.15	<1
Nitrogen dioxide[f]	**1-hour**	**H8H**	**282**	**15** [e]	**297**	**188**	**158**
	Annual	H1H	13	3 [e]	17	90	18
PM10[g]	24-hour	H2H	27.3	30 [d]	57	150	38
	Annual	H1H	7.3	8 [d]	15	50	31
PM2.5[g]	24-hour	H8H	4.6	22.5 [d]	27	35	77
	Annual	H2H	1.6	6 [d]	7	12	59
Sulfur dioxide	1-hour	H4H	0.66	35 [d]	36	196	18
	24-hour	H2H	0.09	11 [d]	11	262	4
	Annual	H1H	0.02	3 [d]	3	52	6

Notes:

[a] Form indicates the calculation used for comparison with the standard, consistent with the statistical definition of the standard. H1H = highest-first-high, H2H = highest-second-high, H4H = highest-fourth-high, H8H = highest-eighth-high.

[b] The more conservative (lower) of the U.S. or Montana air quality standards is shown.

[c] Billings Montana DEQ Air Monitoring Data for CO (2009-2011) (U.S. Environmental Protection Agency 2014a)

[d] Background concentrations were provided by Montana DEQ (2012d, 2012e)

[e] Birney-Tongue River Montana DEQ Air Monitoring Data for NO_2 (2011-2013) (U.S. Environmental Protection Agency 2014a)

[f] 5% of the NO_X emitted as NO_2 and ozone limiting method applied (Fritz pers. comm.). **Shaded text** denotes exceedance of NAAQS 1-hour standard based on model output. Modeled 1-hour NO_2 concentrations shown are not adjusted for model bias.

[g] Includes 85% reduction in coal dust emissions from profiling of coal in rail car and application of topper agent. Chapter 6, *Coal Dust*, provides further information on topper agents and the BNSF tariff that specifies their use.

NAAQS = National Ambient Air Quality Standard; µg/m3 = micrograms per cubic meter; PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

For the high production scenario, the modeling indicates that the NAAQS for 1-hour NO_2 would be exceeded, as highlighted in Table 4-5. The modeling results indicate that the 1-hour NO_2 standard also would be exceeded for the medium production scenario in 2023 (for the northern and southern alternatives[9]) and the high production scenario in 2037 (for the southern alternatives only). The AERMOD model has been documented in a number of studies to over-predict the highest 1-hour NO_2 concentration from 1.7 to 2 times the observed concentration[10] (RTP Environmental Associates 2013, American Petroleum

---

[9] The northern alternatives are the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives. The southern alternatives are the Decker Alternatives.

[10] USEPA is aware of this problem and has been actively working on approaches and methods to improve the modeling of the 1-hour NO_2 concentration (Brode 2014, Owen 2014).

Institute 2012, Golder 2011). Therefore, anticipated maximum 1-hour NO_2 concentrations would be expected to be less than the modeled levels. The maximum modeled 1-hour NO_2 concentrations would not exceed the NAAQS in any analysis year with a downward adjustment for this model bias.

- ### Contribute to Coal Dust Deposition

There are no federal air quality standards for dust deposition, but Montana DEQ has issued a standard for settled (deposited) particulate matter that is not specific to particular types of dust and so would apply to coal dust. Operation of any build alternative would result in the deposition of particulate matter that could contribute to nuisance coal dust impacts. Chapter 6, *Coal Dust*, provides further discussion of nuisance impacts. The assessment below compares coal dust impacts to the Montana air quality standard for settled particulate matter.

The majority of the coal dust particles are large (greater than 250 microns) and deposit quickly after being lifted from the moving train, and therefore, would be deposited within 5 meters (16 feet) of the rail line and would not contribute to nuisance impacts beyond the right-of-way. OEA estimated that these large coal dust particles would account for about 62 percent of the total mass of coal dust emitted from rail line operation. Smaller coal dust particles would disperse further and could contribute to nuisance impacts. The deposition of small coal dust particles was modeled separately using the same techniques as discussed above for modeling of ambient air concentrations. Appendix E, *Air Quality, Emissions, and Modeling Data*, provides further information on the size distribution of coal dust particles.

OEA modeled the monthly average deposition rate for coal dust particles of total suspended particulate[11] (TSP) size (approximately PM50 and smaller) and for particles with a mean mass diameter of 50 to 250 microns under the maximum train traffic (high production scenario, southern alternatives, 26.7 trains per day). (For context, the upper end of this range corresponds to medium-size sand particles.) The maximum TSP deposition rate for coal dust would be 1.1 grams per square meter per month (g/m^2-mo) and would occur at a distance of 50 meters (164 feet) from the rail line. For the 50- to 250-micron-sized coal particles, the maximum monthly deposition rate would be 52.7 g/m^2-mo and would occur slightly closer at 40 meters (131 feet) from the rail line. The maximum combined (TSP plus 50 to 250 microns) deposition rate would be 53.7 g/m^2-mo, which also would occur about 40 meters from the rail line. For the northern alternatives, which have a maximum traffic level of 18.6 trains per day for the high production scenario, the deposition rates would be approximately 30 percent less than for the southern alternatives.

---

[11] Airborne concentrations of TSP are not reported because TSP is not a regulated pollutant and there are no NAAQS or Montana AAQS for TSP.

The Montana DEQ air quality standard for settled particulate matter is 10 g/m^2 for a 30-day average as measured by *dustfall* (fine particles suspended in air that can settle). The dustfall measurement method measures the weight of material that collects in an open bucket left outside for 30 days. Based on this measurement method, the Montana settled particulate matter standard could be exceeded at a distance of up to 60 meters (197 feet) by the southern alternatives under the high production scenario (maximum of 26.7 trains per day) if background dustfall (existing dust from non-project sources) is near zero. These distances would be approximately 30 percent less for the northern alternatives under the high production scenario (maximum of 18.6 trains per day). The average right-of-way width varies by build alternative from 367 feet (for the Tongue River East Alternative) to 458 feet (for the Decker Alternative). Because the track generally would be close to the center of the right-of-way, the average distances from the track to the edge of the right-of-way would be about 184 feet to 229 feet. These distances are comparable to the 197-foot distance within which the settled particulate matter standard could be exceeded with the maximum of 26.7 trains per day. Therefore, the build alternatives are not expected to exceed the Montana settled particulate matter standard outside the right-of-way except possibly under the high production scenario at locations where the right-of-way is narrow or where background dustfall values are elevated.

The New South Wales (Australia) Department of Environment and Conservation (DEC) has applied an assessment criterion for maximum increase in deposition (as insoluble solids) of 2 g/m^2/month (New South Wales Department of Environment and Conservation 2005).[12] DEC considers this value adequate to protect against nuisance impacts (e.g., buildup of deposited particulate matter on surfaces, resulting in the need to clean more frequently, and soiling of laundry being dried outdoors). A fact sheet published to help the public use the DEC guidance states that a total dust deposition rate of 4 g/m^2/month from all sources equates to a visible layer of dust on outdoor furniture or on a clean rail car (New South Wales EDO 2012).

The measurement method for the DEC criterion (Standards New Zealand 2003) is based on particles able to pass through a 1-millimeter mesh sieve (1,000 microns, about the size of coarse to very coarse sand). It is unclear how much coal dust this method would collect, as most of the coal particles are not spherical in shape and so might not pass through a 1-millimeter mesh. OEA assumed that most particles less than 250 microns would pass through this filter and would be captured using the DEC measurement method, but larger sizes would not. The DEC deposition criterion could be exceeded up to a distance of 70 meters (230 feet) by the southern alternatives under the high production scenario (maximum of 26.7 trains per day). Some nuisance-level impacts could occur under this scenario; impacts could also occur where the right-of-way is narrow. For the northern alternatives under the high production scenario (maximum of

---

[12] Few agencies have issued guidelines for deposition. The New South Wales DEC may be the only agency that has issued a guideline specifically for deposition increase that is oriented toward coal dust.

18.6 trains per day), exceedances of the DEC nuisance criteria beyond the right-of-way would be much less likely and would only occur where the right-of-way is narrow.

- **Contribute to Visible Airborne Dust**

  Operation of any build alternative would contribute to visible airborne dust. This form of dust typically consists of TSP and larger-sized particles. This dust, suspended for seconds to minutes before it is deposited, can cause a nuisance near the rail line. PM10 and PM2.5 particles can remain suspended for hours to weeks and can contribute to impacts on visibility in Class I and sensitive Class II areas. This type of visibility impact would occur over much longer distances than nuisance impacts and typically would be analyzed in the context of scenic views. Appendix U, *Cumulative Impacts*, provides further information on visibility impacts in Class I and sensitive Class II areas. These types of visibility impacts are distinct from the visual impacts addressed in Chapter 10, *Visual Resources*, which assesses the visual effect of the rail line itself in the *project viewshed* (the total area from which any viewer would have views of the proposed rail line).

  Nuisance impacts such as short-term visible dust clouds are not well studied and consequently thresholds for impacts are not well defined (Queensland Rail 2008). Most of the evidence of visible coal dust emissions comes from anecdotal reports of dust plumes or after-the-fact observations of coal dust deposited along the rail line and not from well-designed studies (Calvin et al. 1993). A Canadian study noted that complaints and investigations of nuisance impacts of fugitive coal dust emissions have a history in many areas of Canada. The study documented a number of visible dusting events that led to citizen complaints but found no quantitative data to relate those visible dusting events to overall dust control efficiency (Canadian Council of Ministers of the Environment 2001). A more recent Australian study noted that the following nuisance impacts are the most common reported (New South Wales Ministry of Health 2007).

  - Short-term reduction in visibility, at a local scale or over longer distances such as scenic views.
  - Buildup of particulate matter on surfaces in residences, resulting in the need to clean more frequently.
  - Soiling of laundry being dried outdoors.
  - Buildup of particulate matter on residential roofs. Where the residents collect rainwater for drinking, rainfall can flush the particulate matter into rainwater tanks, potentially affecting the quality of drinking water.

  The potential for impacts at a specific location cannot be assessed precisely because this potential is affected by many factors such as train traffic levels, train speed, coal dust emission reduction measures in use, distance from the track, and local topographic and meteorological conditions. If nuisance or visibility impacts were to occur under the build alternatives, the high production scenarios would be expected to result in more frequent impacts than low and medium production scenarios. Measures to suppress coal particulate matter emissions, including use of topper agents as would be required by TRRC, would reduce nuisance and visibility impacts from airborne coal dust. Other programs that railroads have implemented to address visible coal dust include trackside dust sampling to monitor the effectiveness of shippers' emission reduction measures and toll-free complaint reporting lines (Norfolk Southern 2014).

- **Increase the Risk of Wildfires and Subsequent Pollutant Emissions**

  Operation of any build alternative could lead to an increase in wildfires and subsequent air pollutant emissions. The incidence of railroad-caused fires is low compared to that of other human-caused fires. The Montana Department of Natural Resources and Conservation (DNRC) determined that, from 1981 to 2013, a majority of wildfires in the state were due to human causes (53 percent) and lightning strikes caused the remaining 47 percent of wildfires (Montana Department of Military Affairs, Disaster and Emergency Services 2013). Rail operation accounted for only 4 percent of human-caused fires. (Montana Department of Military Affairs, Disaster and Emergency Services 2013, Montana Department of Natural Resources and Conservation 2012). Of the 4 percent of rail-caused fires, acreage losses resulting from railroad-caused grass fires are comparably small. For example, the three fires caused by railroads in 2011 (the most recent data available) affected a total of 1 acre (Montana Department of Natural Resources and Conservation 2012). Because the area affected by railroad-caused wildfires likely would not be substantial based on the historical record, OEA did not quantify potential emissions from fires resulting from the operation of the proposed rail line. Chapter 12, *Land Resources*, and Appendix I, *Wildfire Risk to Vegetation*, provide further information on impacts from wildfires.

4.5.2 Impacts by Build Alternative

The impacts on air quality that are specific to each build alternative are described below, and are represented in the following tables.

- Table 4-6 shows the total emissions of criteria pollutants, VOCs, and HAPs anticipated from construction activities for each build alternative. Tables 4-7 and 4-8 show the tons of emissions per year for an 8-month construction schedule (construction activities occurring for 8 months per year at 12 hours per day, 7 days per week) and a 12-month construction schedule (construction activities occurring for 12 months per year at 24 hours per day, 7 days per week), respectively, by build alternative. For further detail on the construction schedule, see Chapter 2, Section 2.2.9, *Construction Schedule*.
- Tables 4-9 and 4-10 show the total particulate matter emissions anticipated from construction of each build alternative for an 8-month construction schedule and a 12-month construction schedule, respectively. Tables 4-11 and 4-12 show the tons of particulate matter emissions per year for an 8-month construction schedule and a 12-month construction schedule, respectively, by build alternative.

- Tables 4-13, 4-14, and 4-15 show the estimated locomotive exhaust emissions during operation by build alternative for the low, medium, and high production scenarios, respectively.
- Table 4-16 shows the estimated locomotive exhaust emissions during operation for the year that would have the maximum NO_X emissions (2030), corresponding to the maximum modeled concentrations shown in Table 4-5.
- Tables 4-17, 4-18, and 4-19 show the estimated coal dust particulate matter emissions by build alternative for the low, medium, and high production scenarios, respectively. These estimates incorporate an 85 percent reduction rate due to BNSF's requirement that shippers apply topper agents.
- Table 4-20 shows the estimated fugitive particulate matter that would be emitted from within the right-of-way because of wind erosion from exposed earth.
- Table 4-21 shows the estimated particulate matter emissions from all sources attributed to operation of each build alternative.

Table 4-6. Exhaust Emissions from Construction Activities (total tons for construction period): 8-Month or 12-Month Construction Schedule[a]

	Build Alternative									
Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Criteria Pollutants and Volatile Organic Compounds										
CO	2,118.97	3,194.81	3,106.94	4,181.62	1,684.30	2,322.09	3,152.69	3,804.00	3,771.82	3,773.27
NO_X	1,380.87	2,081.86	2,034.49	2,726.47	1,101.64	1,513.84	2,063.73	2,484.90	2,427.22	2,431.96
Lead	0.005	0.008	0.007	0.010	0.004	0.006	0.007	0.009	0.009	0.009
PM10	59.20	89.23	87.03	116.85	47.21	64.94	88.33	106.44	103.90	104.08
PM2.5	57.11	86.08	83.96	112.73	45.55	62.66	85.22	102.69	100.22	100.41
SO_2	3.01	4.54	4.42	5.95	2.40	3.30	4.49	5.41	5.33	5.33
VOCs	177.69	267.90	261.07	350.73	141.44	194.74	264.86	319.30	314.35	314.70
Hazardous Air Pollutants										
Acetaldehyde	6.33	9.54	9.29	12.49	5.04	6.93	9.43	11.37	11.19	11.20
Acrolein	1.18	1.77	1.73	2.32	0.94	1.29	1.75	2.11	2.08	2.08
Benzene	4.00	6.03	5.87	7.90	3.18	4.38	5.96	7.18	7.13	7.13
1,3-Butadiene	0.52	0.78	0.76	1.02	0.41	0.57	0.77	0.93	0.92	0.92
Ethylbenzene	0.47	0.71	0.69	0.93	0.38	0.52	0.70	0.85	0.83	0.84
Formaldehyde	8.54	12.87	12.57	16.86	6.81	9.36	12.75	15.36	15.01	15.04
n-Hexane	0.35	0.53	0.51	0.69	0.28	0.38	0.52	0.63	0.62	0.62
Toluene	0.67	1.01	0.99	1.33	0.54	0.74	1.00	1.21	1.19	1.19
Xylene	6.33	9.54	9.29	12.49	5.04	6.93	9.43	11.37	11.19	11.20

Notes:

[a] The total amount of construction activity is assumed to be the same with either the 8-month or the 12-month schedule

CO = carbon monoxide; NO_X = nitrogen oxides, PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

Table 4-7. Exhaust Emissions from Construction Activities (average tons per year): 8-Month Construction Schedule[a,b]

	Build Alternative									
Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Construction Duration (Months of Activity)	24.0	38.0	20.0	30.0	36.0	45.2	36.0	49.7	45.0	45.0
Criteria Pollutants and Volatile Organic Compounds										
CO	706.32	673.17	621.39	673.26	673.72	580.52	630.54	673.45	628.64	628.88
NO_X	460.29	438.66	406.90	438.98	440.66	378.46	412.75	439.92	404.54	405.33
Lead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM10	19.73	18.80	17.41	18.81	18.88	16.24	17.67	18.84	17.32	17.35
PM2.5	19.04	18.14	16.79	18.15	18.22	15.66	17.04	18.18	16.70	16.73
SO_2	1.00	0.96	0.88	0.96	0.96	0.83	0.90	0.96	0.89	0.89
VOCs	59.23	56.45	52.21	56.47	56.58	48.68	52.97	56.53	52.39	52.45
Hazardous Air Pollutants										
Acetaldehyde	2.11	2.01	1.86	2.01	2.01	1.73	1.89	2.012	1.87	1.87
Acrolein	0.39	0.37	0.35	0.37	0.37	0.32	0.35	0.374	0.35	0.35
Benzene	1.33	1.27	1.17	1.27	1.27	1.10	1.19	1.272	1.19	1.19
1,3-Butadiene	0.17	0.16	0.15	0.16	0.17	0.14	0.15	0.165	0.15	0.15
Ethylbenzene	0.16	0.15	0.14	0.15	0.15	0.13	0.14	0.150	0.14	0.14
Formaldehyde	2.85	2.71	2.51	2.71	2.72	2.34	2.55	2.719	2.50	2.51
n-Hexane	0.12	0.11	0.10	0.11	0.11	0.10	0.10	0.111	0.10	0.10
Toluene	0.26	0.24	0.23	0.24	0.24	0.21	0.23	0.245	0.23	0.23
Xylene	0.22	0.21	0.20	0.21	0.21	0.18	0.20	0.214	0.20	0.20

Notes:

[a] Assuming that construction activity occurs for 8 months of the year, at 12 hours a day, 7 days a week

[b] Construction emissions represent an average tons per year based on the number of construction field seasons necessary to accommodate the actual number of months in which construction would occur. For example, the Decker East 8-month construction schedule typically would extend over 6 field seasons in 6 calendar years, and the 12-month construction schedule would extend over 3 or 4 calendar years without regard to season.

CO = carbon monoxide; NO_X = nitrogen oxides, PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

Table 4-8. Exhaust Emissions from Construction Activities (average tons per year): 12-Month Construction Schedule[a,b]

	Build Alternative									
Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Construction Duration (Months of Activity)	20.1	30.4	16.0	22.1	30.0	36.2	29.5	39.8	35.3	35.3
Criteria Pollutants and Volatile Organic Compounds										
CO	1,262.30	1,262.20	1,263.23	1,262.63	1,263.05	1,262.72	1,262.96	1,262.36	1,257.27	1,257.76
NO_X	822.60	822.50	826.23	823.15	826.79	824.85	827.01	823.08	809.07	810.65
Lead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM10	35.26	35.25	35.41	35.31	35.39	35.33	35.38	35.28	34.63	34.69
PM2.5	34.02	34.01	34.16	34.07	34.14	34.09	34.13	34.03	33.41	33.47
SO_2	1.79	1.79	1.80	1.80	1.80	1.80	1.80	1.79	1.78	1.78
VOCs	105.85	105.84	106.08	105.89	106.11	105.99	106.12	105.88	104.78	104.90
Hazardous Air Pollutants										
Acetaldehyde	3.77	3.77	3.78	3.77	3.78	3.77	3.78	3.77	3.73	3.73
Acrolein	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.69	0.69
Benzene	2.38	2.38	2.39	2.38	2.39	2.39	2.39	2.38	2.38	2.38
1,3-Butadiene	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Ethylbenzene	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Formaldehyde	5.09	5.09	5.10	5.09	5.11	5.10	5.11	5.09	5.00	5.01
n-Hexane	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Toluene	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.45	0.45
Xylene	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40

Notes:

[a] Assuming that construction activity occurs for 12 months of the year, at 24 hours a day, 7 days a week

[b] Construction emissions represent an average tons per year based on the number of construction field seasons necessary to accommodate the actual number of months in which construction would occur. For example, the Decker East 8-month construction schedule typically would extend over 6 field seasons in 6 calendar years, and the 12-month construction schedule would extend over 3 or 4 calendar years without regard to season.

CO = carbon monoxide; NO_X = nitrogen oxides, PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

Table 4-9. Fugitive, Exhaust, and Total Particulate Matter Emissions from Construction (total tons): 8- Month Construction Schedule[a]

	PM10			PM2.5		
Build Alternative	**Fugitive**	**Exhaust**	**Total**	**Fugitive**	**Exhaust**	**Total**
Tongue River	6,222	59.2	6,282	933	57.1	990
Tongue River East	9,795	89.2	9,884	1,469	86.1	1,555
Colstrip	3,220	47.2	3,267	483	45.6	529
Colstrip East	4,801	64.9	4,866	720	62.7	783
Tongue River Road	10,211	88.3	10,300	1,532	85.2	1,617
Tongue River Road East	12,690	106.4	12,796	1,903	102.7	2,006
Moon Creek	9,773	87.0	9,860	1,466	84.0	1,550
Moon Creek East	13,484	116.9	13,601	2,023	112.7	2,135
Decker	9,149	103.9	9,253	1,372	100.2	1,473
Decker East	8,829	104.1	8,933	1,324	100.4	1,425

Notes:

[a] Assuming that construction activity occurs for 8 months of the year, at 12 hours a day, 7 days a week. The total number of months of activity for the 8-month construction schedule would vary by build alternative: see Chapter 2, Table 2-3, *Build Alternative Construction Schedule.*

PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

Table 4-10. Fugitive, Exhaust, and Total Particulate Matter Emissions from Construction (total tons): 12-Month Construction Schedule[a]

	PM10			PM2.5		
Build Alternative	**Fugitive**	**Exhaust**	**Total**	**Fugitive**	**Exhaust**	**Total**
Tongue River	5,420	59.2	5,479	813	57.1	870
Tongue River East	8,207	89.2	8,296	1,231	86.1	1,317
Colstrip	2,771	47.2	2,818	416	45.6	461
Colstrip East	3,888	64.9	3,953	583	62.7	646
Tongue River Road	8,803	88.3	8,891	1,320	85.2	1,406
Tongue River Road East	10,593	106.4	10,699	1,589	102.7	1,692
Moon Creek	8,338	87.0	8,425	1,251	84.0	1,335
Moon Creek East	11,272	116.9	11,389	1,691	112.7	1,804
Decker	7,750	103.9	7,854	1,163	100.2	1,263
Decker East	7,495	104.1	7,599	1,124	100.4	1,225

Notes:

[a] Assuming that construction activity occurs for 12 months of the year, at 24 hours a day, 7 days a week. The total number of months of activity for the 12-month construction schedule would vary by build alternative: see Chapter 2, Table 2-3, *Build Alternative Construction Schedule*.PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

Table 4-11. Fugitive, Exhaust, and Total Particulate Matter Emissions from Construction (average tons per year): 8-Month Construction Schedule[a,b]

	PM10			PM2.5		
Build Alternative	**Fugitive**	**Exhaust**	**Total**	**Fugitive**	**Exhaust**	**Total**
Tongue River	2,074	19.73	2,094	311	19.04	330
Tongue River East	2,064	18.80	2,083	310	18.14	328
Colstrip	1,288	18.88	1,307	193	18.22	211
Colstrip East	1,200	16.24	1,216	180	15.66	196
Tongue River Road	2,042	17.67	2,060	306	17.04	323
Tongue River Road East	2,247	18.84	2,265	337	18.18	355
Moon Creek	1,955	17.41	1,972	293	16.79	310
Moon Creek East	2,171	18.81	2,190	326	18.15	344
Decker	1,525	17.32	1,542	229	16.70	245
Decker East	1,472	17.35	1,489	221	16.73	237

Notes:

[a] Assuming that construction activity occurs for 8 months of the year, at 12 hours a day, 7 days a week. The total number of months of activity for the 8-month construction schedule would vary by build alternative: see Chapter 2, Table 2-3, *Build Alternative Construction Schedule*.

[b] Construction emissions represent an average tons per year based on the number of construction field seasons necessary to accommodate the actual number of months in which construction would occur. For example, the Decker East 8-month construction schedule typically would extend over 6 field seasons in 6 calendar years, and the 12-month construction schedule would extend over 3 or 4 calendar years without regard to season.

PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

Table 4-12. Fugitive, Exhaust, and Total Particulate Matter Emissions from Construction (average tons per year): 12-Month Construction Schedule[a,b]

	PM10			PM2.5		
Build Alternative	**Fugitive**	**Exhaust**	**Total**	**Fugitive**	**Exhaust**	**Total**
Tongue River	3,229	35.26	3,264	484	34.02	518
Tongue River East	3,242	35.25	3,278	486	34.01	520
Colstrip	2,078	35.41	2,114	312	34.16	346
Colstrip East	2,114	35.31	2,149	317	34.07	351
Tongue River Road	3,527	35.39	3,562	529	34.14	563
Tongue River Road East	3,516	35.33	3,552	527	34.09	562
Moon Creek	3,389	35.38	3,425	508	34.13	543
Moon Creek East	3,403	35.28	3,438	510	34.03	544
Decker	2,583	34.63	2,618	388	33.41	421
Decker East	2,498	34.69	2,533	375	33.47	408

Notes:

[a] Assuming that construction activity occurs for 12 months of the year, at 24 hours a day, 7 days a week. The total number of months of activity for the 12-month construction schedule would vary by build alternative: see Chapter 2, Table 2-3, *Build Alternative Construction Schedule*.

[b] Construction emissions represent an average tons per year based on the number of construction field seasons necessary to accommodate the actual number of months in which construction would occur. For example, the Decker East 8-month construction schedule typically would extend over 6 field seasons in 6 calendar years, and the 12-month construction schedule would extend over 3 or 4 calendar years without regard to season.

PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

Table 4-13. Locomotive Exhaust Emissions during Operation (tons per year): Low Production Scenario[a]

	Build Alternative									
Pollutants	Tongue River	Tongue River East	Colstrip	Colstrip East	Tongue River Road	Tongue River Road East	Moon Creek	Moon Creek East	Decker	Decker East
Criteria Pollutants and Volatile Organic Compounds (tons/year)										
CO	82.79	84.54	69.99	72.29	82.79	84.10	81.04	83.11	55.88	54.24
NO$_X$	130.61	133.37	110.42	114.04	130.61	132.68	127.85	131.12	88.16	85.58
PM10	3.24	3.31	2.74	2.83	3.24	3.29	3.17	3.25	2.19	2.12
PM2.5	3.14	3.21	2.65	2.74	3.14	3.19	3.07	3.15	2.12	2.06
SO$_2$	0.30	0.30	0.25	0.26	0.30	0.30	0.29	0.30	0.20	0.20
VOCs	5.92	6.05	5.01	5.17	5.92	6.02	5.80	5.95	4.00	3.88
Hazardous Air Pollutants (tons/year)										
Acetaldehyde	0.00145	0.00148	0.00123	0.00127	0.00145	0.00148	0.00142	0.00146	0.00098	0.00095
Acrolein	0.00028	0.00028	0.00023	0.00024	0.00028	0.00028	0.00027	0.00028	0.00019	0.00018
Benzene	0.00017	0.00017	0.00014	0.00015	0.00017	0.00017	0.00016	0.00017	0.00011	0.00011
1,3-Butadiene	0.00020	0.00020	0.00017	0.00017	0.00020	0.00020	0.00019	0.00020	0.00013	0.00013
Ethylbenzene	0.01185	0.01210	0.01002	0.01035	0.01185	0.01204	0.01160	0.01190	0.00800	0.00776
Formaldehyde	0.00306	0.00312	0.00259	0.00267	0.00306	0.00311	0.00299	0.00307	0.00207	0.00200
n-Hexane	0.03258	0.03327	0.02755	0.02845	0.03258	0.03310	0.03190	0.03271	0.02200	0.02135
Lead	0.00027	0.00028	0.00023	0.00024	0.00027	0.00028	0.00027	0.00027	0.00018	0.00018
Toluene	0.01896	0.01936	0.01603	0.01655	0.01896	0.01926	0.01856	0.01903	0.01280	0.01242
Xylene	0.05027	0.05133	0.04250	0.04389	0.05027	0.05106	0.04920	0.05047	0.03393	0.03294

Notes:

[a] Scenario assumes production year 2037, 7.4 trains per day for all build alternatives

CO = carbon monoxide; NO$_X$ = nitrogen oxides, PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; SO$_2$ = sulfur dioxide; VOCs = volatile organic compounds

Table 4-14. Locomotive Exhaust Emissions during Operation (tons per year): Medium Production Scenario[a]

	Build Alternative									
Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Criteria Pollutants and Volatile Organic Compounds (tons/year)										
CO	133.77	138.54	113.30	118.94	134.16	137.84	130.97	135.74	80.23	78.26
NO_X	211.04	218.56	178.74	187.64	211.65	217.46	206.62	214.15	194.27	189.50
PM10	5.23	5.42	4.43	4.65	5.25	5.39	5.12	5.31	4.87	4.75
PM2.5	5.07	5.25	4.30	4.51	5.09	5.23	4.97	5.15	4.72	4.60
SO_2	0.48	0.50	0.41	0.43	0.48	0.50	0.47	0.49	0.29	0.28
VOCs	9.57	9.91	8.11	8.51	9.60	9.86	9.37	9.71	8.22	8.02
Hazardous Air Pollutants (tons/year)										
Acetaldehyde	0.00235	0.00243	0.00199	0.00209	0.00236	0.00242	0.00230	0.00238	0.00219	0.00213
Acrolein	0.00045	0.00046	0.00038	0.00040	0.00045	0.00046	0.00044	0.00045	0.00042	0.00041
Benzene	0.00027	0.00028	0.00023	0.00024	0.00027	0.00028	0.00026	0.00027	0.00025	0.00025
1,3-Butadiene	0.00032	0.00033	0.00027	0.00029	0.00032	0.00033	0.00031	0.00033	0.00030	0.00029
Ethylbenzene	0.01915	0.01983	0.01622	0.01702	0.01920	0.01973	0.01875	0.01943	0.01644	0.01603
Formaldehyde	0.00494	0.00512	0.00419	0.00440	0.00496	0.00509	0.00484	0.00502	0.00460	0.00449
n-Hexane	0.05265	0.05453	0.04459	0.04681	0.05280	0.05425	0.05155	0.05343	0.04520	0.04409
Lead	0.00044	0.00046	0.00037	0.00039	0.00044	0.00045	0.00043	0.00045	0.00041	0.00040
Toluene	0.03063	0.03173	0.02595	0.02724	0.03072	0.03157	0.02999	0.03108	0.02630	0.02565
Xylene	0.08122	0.08412	0.06879	0.07222	0.08146	0.08369	0.07952	0.08242	0.05416	0.05283

Notes:

[a] Scenario assumes production year 2037 for northern alternatives, 2030 for southern alternatives, 11.9 trains per day for all build alternatives. Projected trains per day for the southern alternatives decrease from 2030 to 2037, so emissions are estimated for 2030 to be conservative (high).

CO = carbon monoxide; NO_X = nitrogen oxides, PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

Table 4-15. Locomotive Exhaust Emissions during Operation (tons per year): High Production Scenario[a]

	Build Alternative									
Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Criteria Pollutants and Volatile Organic Compounds (tons/year)										
CO	208.72	215.72	176.73	185.09	208.72	214.62	204.34	211.34	160.45	159.46
NO_X	329.28	340.32	278.81	292.01	329.28	338.59	322.37	333.42	253.12	251.56
PM10	8.16	8.44	6.91	7.24	8.16	8.39	7.99	8.26	6.27	6.24
PM2.5	7.92	8.18	6.70	7.02	7.92	8.14	7.75	8.02	6.09	6.05
SO_2	0.75	0.78	0.64	0.67	0.75	0.77	0.74	0.76	0.58	0.57
VOCs	14.94	15.44	12.65	13.25	14.94	15.36	14.62	15.12	11.48	11.41
Hazardous Air Pollutants (tons/year)										
Acetaldehyde	0.00367	0.00379	0.00310	0.00325	0.00367	0.00377	0.00359	0.00371	0.00282	0.00280
Acrolein	0.00070	0.00072	0.00059	0.00062	0.00070	0.00072	0.00068	0.00071	0.00054	0.00053
Benzene	0.00042	0.00044	0.00036	0.00037	0.00042	0.00043	0.00041	0.00043	0.00032	0.00032
1,3-Butadiene	0.00050	0.00052	0.00043	0.00045	0.00050	0.00052	0.00049	0.00051	0.00039	0.00038
Ethylbenzene	0.02987	0.03087	0.02529	0.02649	0.02987	0.03072	0.02925	0.03025	0.02296	0.02282
Formaldehyde	0.00771	0.00797	0.00653	0.00684	0.00771	0.00793	0.00755	0.00781	0.00593	0.00589
n-Hexane	0.08215	0.08490	0.06956	0.07285	0.08215	0.08447	0.08043	0.08318	0.06315	0.06276
Lead	0.00069	0.00071	0.00058	0.00061	0.00069	0.00070	0.00067	0.00069	0.00053	0.00052
Toluene	0.04780	0.04940	0.04047	0.04239	0.04780	0.04915	0.04679	0.04840	0.03674	0.03652
Xylene	0.12673	0.13098	0.10730	0.11238	0.12673	0.13031	0.12407	0.12832	0.09742	0.09682

Notes:

[a] Scenario assumes production year 2037, 18.6 trains per day for northern alternatives, 26.7 trains per day for southern alternatives

CO = carbon monoxide; NO_X = nitrogen oxides, PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

Table 4-16. Locomotive Exhaust Emissions during Operation (tons per year): Year of Maximum NO_X Emissions[a]

	Build Alternative									
Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Criteria Pollutants and Volatile Organic Compounds (tons/year)										
CO	208.72	215.82	176.73	185.20	152.85	214.73	204.34	211.45	188.93	183.90
NO_X	505.40	522.61	427.94	448.46	370.13	519.96	494.80	512.02	457.49	445.31
PM10	12.66	13.09	10.72	11.23	9.27	13.02	12.39	12.82	11.46	11.15
PM2.5	12.28	12.70	10.40	10.90	8.99	12.63	12.02	12.44	11.12	10.82
SO2	0.75	0.78	0.64	0.67	0.55	0.77	0.74	0.76	0.68	0.66
VOCs	21.38	22.11	18.10	18.97	15.66	22.00	20.93	21.66	19.35	18.84
Hazardous Air Pollutants (tons/year)										
Acetaldehyde	0.00569	0.00588	0.00481	0.00505	0.00569	0.00585	0.00557	0.00576	0.00515	0.00501
Acrolein	0.00108	0.00112	0.00092	0.00096	0.00108	0.00111	0.00106	0.00110	0.00098	0.00095
Benzene	0.00065	0.00068	0.00055	0.00058	0.00065	0.00067	0.00064	0.00066	0.00059	0.00058
1,3-Butadiene	0.00078	0.00081	0.00066	0.00069	0.00078	0.00080	0.00076	0.00079	0.00070	0.00069
Ethylbenzene	0.04276	0.04422	0.03621	0.03794	0.04276	0.04399	0.04186	0.04332	0.03871	0.03768
Formaldehyde	0.01196	0.01237	0.01013	0.01062	0.01196	0.01231	0.01171	0.01212	0.01083	0.01054
n-Hexane	0.11759	0.12159	0.09957	0.10434	0.11759	0.12098	0.11512	0.11913	0.10644	0.10361
Lead	0.00106	0.00110	0.00090	0.00094	0.00106	0.00109	0.00104	0.00108	0.00096	0.00094
Toluene	0.06841	0.07074	0.05793	0.06071	0.06841	0.07039	0.06698	0.06931	0.06193	0.06028
Xylene	0.14091	0.14571	0.11931	0.12503	0.14091	0.14497	0.13795	0.14275	0.12755	0.12415

Notes:

[a] Scenario assumes production year 2030, 18.6 trains per day for northern alternatives, 26.7 trains per day for southern alternatives

CO = carbon monoxide; NO_X = nitrogen oxides, PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

Table 4-17. Coal Dust Emissions from Trains during Operation (tons per year): Low Production Scenario [a]

	Build Alternative									
Sources and Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Wind-Driven from Loaded Rail Cars (tons/year)										
TSP	146.0	151.0	71.9	75.3	139.8	143.9	112.7	116.7	57.4	64.0
PM10	65.7	68.0	32.3	33.9	62.9	64.8	50.7	52.5	25.8	28.8
PM2.5	12.6	13.0	6.2	6.5	12.0	12.4	9.7	10.0	4.9	5.5
Parasitic Load and Vibrations of Rail Cars (tons/year)										
TSP	7.3	7.6	3.6	3.8	7.0	7.2	5.6	5.8	2.9	3.2
PM10	3.3	3.4	1.6	1.7	3.1	3.2	2.5	2.6	1.3	1.4
PM2.5	0.6	0.6	0.3	0.3	0.6	0.6	0.5	0.5	0.2	0.3
Unloaded Rail Cars (tons/year)										
TSP	0.59	0.61	0.29	0.30	0.57	0.58	0.46	0.47	0.23	0.23
PM10	0.27	0.28	0.13	0.14	0.25	0.26	0.21	0.21	0.10	0.10
PM2.5	0.05	0.05	0.03	0.03	0.05	0.05	0.04	0.04	0.02	0.02
Total (tons/year)										
TSP	153.9	159.2	75.7	79.4	147.4	151.7	118.8	123.0	60.5	67.4
PM10	69.3	71.6	34.1	35.7	66.3	68.3	53.5	55.3	27.2	30.3
PM2.5	13.2	13.7	6.5	6.8	12.7	13.0	10.2	10.6	5.2	5.8

Notes:

[a] Scenario assumes production year 2037, 7.4 trains per day for all build alternatives

TSP = total suspended particles; PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

Table 4-18. Coal Dust Emissions from Trains during Operation (tons per year): Medium Production Scenario

	Build Alternative									
Sources and Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Wind-Driven from Loaded Rail Cars (tons/year)										
TSP	239.3	244.4	116.8	122.4	227.8	234.1	182.7	190.3	82.7	92.7
PM10	107.7	110.0	52.6	55.1	102.5	105.3	82.2	85.6	37.2	41.7
PM2.5	20.6	21.0	10.0	10.5	19.6	20.1	15.7	16.4	7.1	8.0
Parasitic Load and Vibrations of Rail Cars (tons/year)										
TSP	12.0	12.2	5.8	6.1	11.4	11.7	9.1	9.5	4.1	4.6
PM10	5.4	5.5	2.6	2.8	5.1	5.3	4.1	4.3	1.9	2.1
PM2.5	1.0	1.1	0.5	0.5	1.0	1.0	0.8	0.8	0.4	0.4
Unloaded Rail Cars (tons/year)										
TSP	0.96	0.96	0.47	0.50	0.92	0.95	0.74	0.77	0.33	0.33
PM10	0.43	0.43	0.21	0.22	0.41	0.43	0.33	0.35	0.15	0.15
PM2.5	0.08	0.08	0.04	0.04	0.08	0.08	0.06	0.07	0.03	0.03
Total (tons/year)										
TSP	252.3	257.6	123.1	129.0	240.1	246.7	192.6	200.6	87.2	97.6
PM10	113.5	115.9	55.4	58.1	108.0	111.0	86.7	90.3	39.2	43.9
PM2.5	21.7	22.2	10.6	11.1	20.6	21.2	16.6	17.3	7.5	8.4

Notes:

[a] Scenario assumes production year 2037 for northern alternatives, 2030 for southern alternatives, 11.9 trains per day for all build alternatives

TSP = total suspended particles; PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

Table 4-19. Coal Dust Emissions from Trains during Operation (tons per year): High Production Scenario[a]

	Build Alternative									
Sources and Pollutants	**Tongue River**	**Tongue River East**	**Colstrip**	**Colstrip East**	**Tongue River Road**	**Tongue River Road East**	**Moon Creek**	**Moon Creek East**	**Decker**	**Decker East**
Wind-Driven from Loaded Rail Cars (tons/year)										
TSP	374.5	380.5	182.2	190.5	355.4	364.5	285.0	296.3	168.3	194.9
PM10	168.5	171.2	82.0	85.7	159.9	164.0	128.3	133.4	75.7	87.7
PM2.5	32.2	32.7	15.7	16.4	30.6	31.3	24.5	25.5	14.5	16.8
Parasitic Load and Vibrations of Rail Cars (tons/year)										
TSP	18.7	19.0	9.1	9.5	17.8	18.2	14.3	14.8	8.4	9.7
PM10	8.4	8.6	4.1	4.3	8.0	8.2	6.4	6.7	3.8	4.4
PM2.5	1.6	1.6	0.8	0.8	1.5	1.6	1.2	1.3	0.7	0.8
Unloaded Rail Cars (tons/year)										
TSP	1.50	1.50	0.74	0.77	1.44	1.48	1.15	1.20	0.68	0.69
PM10	0.68	0.68	0.33	0.35	0.65	0.66	0.52	0.54	0.31	0.31
PM2.5	0.13	0.13	0.06	0.07	0.12	0.13	0.10	0.10	0.06	0.06
Total (tons/year)										
TSP	394.7	401.0	192.0	200.8	374.6	384.2	300.4	312.4	177.4	205.3
PM10	177.6	180.5	86.4	90.4	168.6	172.9	135.2	140.6	79.8	92.4
PM2.5	33.9	34.5	16.5	17.3	32.2	33.0	25.8	26.9	15.3	17.7

Notes:

[a] Scenario assumes production year 2037, 18.6 trains per day for northern alternatives, 26.7 trains per day for southern alternatives

TSP = total suspended particles; PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

Table 4-20. Fugitive PM Emissions During Operation – Wind Erosion from Exposed Earth Surface (tons per year for all analysis years)

Build Alternative	PM10	PM2.5
Tongue River	30.71	4.61
Tongue River East	12.55	1.88
Colstrip[a]	25.32	3.80
Colstrip East[a]	7.06	1.06
Tongue River Road	39.36	5.90
Tongue River Road East	21.06	3.16
Moon Creek	41.17	6.18
Moon Creek East	2.25	0.34
Decker	23.01	3.45
Decker East	6.23	0.93

Notes:

[a] Does not include existing Colstrip Subdivision because new land disturbance would be minimal along the Colstrip Subdivision

PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

Table 4-21. PM10 and PM2.5 Emissions from All Sources during Operation (tons per year)

Sources[b] and Pollutants	Build Alternative[a]									
	Tongue River	Tongue River East	Colstrip	Colstrip East	Tongue River Road	Tongue River Road East	Moon Creek	Moon Creek East	Decker	Decker East
Low production, 2037, 7.4 trains per day for all build alternatives										
PM10	103.20	87.49	62.14	45.63	108.93	92.61	97.82	81.60	31.65	38.68
PM2.5	20.98	18.78	12.97	10.63	21.72	19.40	19.47	17.17	7.66	8.79
Medium production, 2037 for northern alternatives, 2030 for southern alternatives, 11.9 trains per day for all build alternatives										
PM10	149.47	133.88	85.15	69.78	152.64	137.48	132.95	118.60	49.23	58.59
PM2.5	31.38	29.29	18.68	16.67	31.64	29.61	27.70	25.85	13.35	14.92
High production, 2037 and 18.6 trains per day for northern alternatives, 2030 and 26.7 trains per day for southern alternatives										
PM10	216.51	201.46	118.64	104.67	216.09	202.34	184.36	171.84	93.59	111.07
PM2.5	46.47	44.56	27.33	25.35	46.04	44.34	39.77	38.33	24.10	27.23

Notes:

[a] Locomotives, rail cars, and wind erosion of exposed earth

[b] Particulate matter emissions from vehicles delayed at grade crossings are not included because they would total less than 0.1 ton per year of PM10 or PM2.5

PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter

4.5.2.1 Northern Alternatives

Construction and operation of any of the Tongue River Alternatives, Colstrip Alternatives, Tongue River Road Alternatives, or Moon Creek Alternatives would result in the common air quality impacts quantified in Tables 4-6 through 4-21. The emission levels shown in Tables 4-6 through 4-21 serve as indicators of the impacts on ambient concentrations that could result from those emissions, and are useful for comparing overall impacts across build alternatives. (There is no applicable regulatory standard for the number of tons of emissions.) During construction, ambient pollutant concentrations beyond the right-of-way[13] would increase from existing levels but would not exceed the NAAQS or Montana AAQS. During operation, estimated ambient pollutant concentrations beyond the right-of-way would increase from existing levels but would not exceed the NAAQS or Montana AAQS. Appendix E, *Air Quality, Emissions, and Modeling Data*, provides further information on the estimated ambient pollutant concentrations, deposition impacts, and comparison to standards.

4.5.2.2 Southern Alternatives

Construction and operation of either of the Decker Alternative would result in the common impacts summarized in Tables 4-6 through 4-21. During construction, ambient pollutant concentrations beyond the right-of-way would not exceed the NAAQS or Montana AAQS. During operation, estimated ambient pollutant concentrations beyond the right-of-way would increase from existing levels but would not exceed the NAAQS or Montana AAQS.

4.5.3 No-Action Alternative

Under the No-Action Alternative, TRRC would not construct and operate the proposed Tongue River Railroad, and there would be no impacts on air quality from construction or operation of the proposed rail line.

4.5.4 Mitigation and Unavoidable Environmental Consequences

OEA is recommending that the Board impose two mitigation measures for air quality, both volunteered by TRRC (Chapter 19, Section 19.2.2, *Air Quality*). These measures would require TRRC to minimize fugitive dust and comply with the BNSF Coal Loading Rule.

Even with the implementation of TRRC's voluntary measures, construction and operation of the proposed rail line would cause unavoidable air emissions. Although construction-

---

[13] The air quality analysis does not consider concentrations within the right-of-way because the right-of-way would be fenced and entry by humans would constitute trespass except at specific approved locations, primarily grade crossings, where human crossing of the right-of-way would not lead to air quality impacts because exposure to pollutant concentrations within the right-of-way would last only seconds to minutes.

related emissions would not lead to exceedance of any air quality standards, air pollutants would still be emitted from construction equipment exhaust and fugitive emissions. OEA concludes that construction and operation impacts would be negligible.

4.6 Applicable Regulations

Different federal, state, and local entities are responsible for the regulation of air quality. These entities and the regulations and guidance related to air quality are described in Table 4-22.

Table 4-22. Regulations and Guidance Related to Air Quality

Regulation	**Explanation**
Federal	
National Environmental Policy Act (42 U.S.C. § 4321 *et seq*.)	Requires the consideration of potential environmental effects, including potential effects of (or on) contaminated sites in the environmental impact statement for any proposed major federal agency action. NEPA implementation procedures are set forth in the President's Council on Environmental Quality's Regulations for Implementing NEPA (40 C.F.R. Part 1500).
STB Procedures For Implementation of Environmental Laws (49 C.F.R. Part 1105.7 [e][5])	Sets OEA thresholds for analysis of anticipated effects on air quality. Thresholds are based on projected increases in rail traffic on segments affected by projects, as follows. • Increase of at least eight trains per day in areas USEPA has designated as attainment (having criteria pollutant concentrations within the NAAQS) • Increase of at least three trains per day in areas USEPA has designated as nonattainment (having criteria pollutant concentrations greater than the NAAQS) When a case before the Board would result in an increase in rail traffic that exceeds either threshold, OEA quantifies the anticipated effect on air pollutant emissions.
Clean Air Act of 1963 (42 U.S.C. § 7401)	As amended in 1970, 1977, and 1990, requires USEPA to develop and enforce regulations to protect the public from air pollutants and their health impacts.
Clean Air Act, National Ambient Air Quality Standards (USEPA)	Specifies the maximum acceptable ambient concentrations for six criteria air pollutants: CO, lead, NO_2, O_3, PM10 and PM2.5, and SO_2. Primary NAAQS set limits to protect public health, and secondary NAAQS set limits to protect public welfare.
Clean Air Act, Hazardous Air Pollutants	Requires USEPA to regulate HAPs through emission standards. MSATs, a subset of HAPs, are typically associated with transportation sources including motor vehicles, construction equipment, and locomotives. The most important MSATs are acetaldehyde, acrolein, benzene, 1,3-butadiene, ethyl benzene, formaldehyde, n-hexane, toluene, and xylene.
Clean Air Act, General Conformity (Section 176(c)). General Conformity Rule (40 C.F.R. Part 93, Subpart B)	Prohibits federal entities from taking actions in nonattainment or maintenance areas that do not conform to the SIPs for those areas. To implement this provision, The General Conformity Rule defines the characteristics of a conforming project and requires that a federal agency must be able to exercise

Regulation	Explanation
	continuing program control over the operation of the project to be subject to the rule (40 C.F.R. Part 93.153). The Board does not exercise continuing program control over rail operation and would not exercise such control over operation of the proposed rail line. Accordingly, the proposed project is not subject to the General Conformity Rule. The rule nevertheless provides useful indicators for assessing potential impacts on air quality The rule establishes emissions thresholds, or *de minimis* levels, for use in evaluating the conformity of a project. For a project that is subject to conformity, if the net emission increases due to a project would be less than these thresholds, the project is presumed to conform and no further conformity evaluation is necessary. For a project that is not subject to conformity, these thresholds can be used to indicate whether further analysis may be warranted.
Clean Air Act, Prevention of Significant Deterioration	Protects certain lands designated as mandatory federal Class I areas because air quality is a special feature of the area. Also protects certain areas voluntarily designated as Class I areas at the request of those jurisdictions (e.g., the Northern Cheyenne Reservation). Montana DEQ, a federal land management agency, or a tribal agency may also identify Sensitive Class II areas. In general, if a new major stationary source is located within 100 km (62 miles) of a Class I area, its impacts on concentrations of criteria pollutants in the Class I area must be determined. Impacts are compared to the PSD increments, which are concentration thresholds issued by USEPA and used in permitting major stationary emissions sources in attainment areas. PSD increments are designed to prevent air quality that is better than the NAAQS from deteriorating to the level set by the standards and thus they are more restrictive than the NAAQS. Because the proposed rail line would not be a major stationary source, it is not subject to PSD; however, the PSD increments can be used as thresholds to indicate whether further analysis of air quality impacts may be warranted. In addition to criteria pollutant concentrations, damage to plants and ecosystems from ozone and PM2.5, visibility or regional haze, and acidic deposition are of concern in Class I areas.
Clean Air Act, Prevention of Significant Deterioration, *Visibility*	Visibility impacts occur when emissions absorb and scatter light in the atmosphere, causing haze and reducing the clarity of views. Regional haze impairs visibility and is produced by emissions from numerous sources located across broad geographic areas. Regional haze is made up of directly emitted PM2.5 and secondary PM2.5, which is formed in the atmosphere from chemical reactions of fine particle precursors. PM2.5 precursors include emissions of SO_2 and other SO_x, NO_x, ammonia, and VOCs. The most important secondary PM2.5 particles for visibility impairment are sulfates and nitrates, which are formed from emissions of NO_X and SO_X, respectively. Visibility is measured over 24-hour periods and calculated as a percent increase in light extinction (reduced visibility) compared to a presumed pristine background. Impacts are expressed as the number of days annually that show visibility reductions of 5 percent and 10 percent calculated as reductions in deciviews, a measure of visibility impairment. Reductions of 5 percent and 10 percent correspond to 0.5 and

Regulation	Explanation
	1.0 deciview respectively, where 1.0 deciview represents a perception of a *just noticeable change*. Federal land management agencies often consider a change of 0.5 deciview to be potentially significant and a change of 1.0 deciview to be significant. Visibility levels also may be expressed as a standard visual range in miles during the 20 percent of days with the clearest visibility, during the 20 percent of days with the worst (haziest) visibility, and as the mean visibility for all days. These thresholds are consistent with Federal Land Managers' Air Quality Related Values Work Group (FLAG) 2010 guidance as well as the EPA Regional Haze Regulations (40 C.F.R. Part 51.300 *et seq.*), which consider a 1.0 deciview change potentially significant in mandatory federal Class I areas.
Regional Haze Rule (Section 169A of CAA) (40 C.F.R. Parts 51 and 52); Federal Implementation Plan for Visibility (77 Fed. Reg. 23988)	Sets goals for visibility in many national parks, wilderness areas, and international parks and provides a comprehensive visibility protection program for mandatory federal Class I areas. The visibility improvement goal stated in the rule is to ensure that in Class I areas, visibility on the worst days improves toward natural conditions, and visibility on the best days does not get worse. The Regional Haze Rule requires states to develop SIPs to address emissions that contribute to regional haze. USEPA issued a FIP for visibility in Montana (77 Fed. Reg. 23988). The Regional Haze Rule and the FIP do not contain requirements that apply to the proposed rail line. However, OEA assessed visibility impacts of the proposed rail line on Class I and sensitive Class II areas in the context of cumulative impacts (Appendix U, *Cumulative Impacts*).
Clean Air Act, Prevention of Significant Deterioration, *Acidic Deposition*	Acidic deposition occurs when nitrates and sulfates formed in the atmosphere are deposited to soil, vegetation, and surface water. Federal land management agencies often apply significance thresholds of 3 kg/ha-yr of nitrogen compounds and 5 kg/ha-yr of sulfur compounds (Bureau of Land Management 2013). Acid deposition to lakes can impair water quality by reducing their acid-neutralizing capacity. For lake acidification, federal land management agencies often apply significance thresholds based on U.S. Forest Service guidance (U.S. Forest Service 2000, Fox et al. 1989). These thresholds consider a 10 percent change in acid-neutralizing capacity for lakes with a background acid-neutralizing capacity greater than 25 μeq/l, or a 1 μeq/l change for lakes with a background acid-neutralizing capacity less than 25 μeq/l to be significant.[a, b]
Clean Air Act, Federal Preemption of Locomotive Emissions Regulation	In section 209(e) of the CAA, Congress preempted state and local governments from adopting or enforcing "any standard or other requirement relating to the control of emissions from ...new locomotives or new engines used in locomotives." USEPA established regulations that implement this preemption consistent with Congressional intent to prevent unreasonable burdens on interstate commerce. The regulations prohibit state and local governments from adopting or enforcing any controls that significantly affect a locomotive manufacturer's or remanufacturer's design. USEPA believes that because it has established a strong federal program that addresses locomotive manufacturing, remanufacturing and in-use compliance, and has set emission standards that take maximum advantage of available emission control technologies, there is little that any state could do to further reduce locomotive emissions (U.S. Environmental

Regulation	Explanation
	Protection Agency 1997). The effect of federal preemption is that states and localities have no power to require railroads to install emission controls on their locomotives. In the event that a state or local agency determined that locomotive emissions were causing a violation of the 1-hour NAAQS for nitrogen dioxide at a particular location, for example, the agency would have authority only to regulate the "use, operation, or movement" of trains as provided by CAA Section 209(d).
Clean Air Act, Locomotive Emissions Standards	In 1998, and amended in 2008, USEPA created several tier standards for locomotive engines (40 CFR Parts 85, 89, 92, 94, 1033, 1065, and 1068). The standards apply to all newly manufactured and remanufactured locomotives used in the United States. The tier standards were phased in over several years. The Tier 0 standards took effect beginning in 2001, Tier 2 in 2005, Tier 3 in 2012, and Tier 4, the most stringent standards, in 2015. The reductions required under the Tier 4 standards may necessitate the use of advanced exhaust treatment technologies (e.g., diesel particulate filters and selective catalytic reduction) by locomotive manufacturers. A railroad typically has locomotives that were manufactured in different years and thus meet different tier levels. Over time the average emission rates of the fleet will decrease as the railroad purchases newer, cleaner (Tier 4) locomotives and retires older (Tiers 0-3) locomotives.
Clean Air Act, Regulation of Pollutant Concentrations Including Nitrogen Dioxide	USEPA designates geographic areas as attainment or nonattainment of the NAAQS, as discussed in Section 4.4.2, *Ambient Air Quality*. Under CAA Sec. 172, in nonattainment areas the state must develop a State Implementation Plan (SIP) that demonstrates how the area will reach attainment, and which must be approved by USEPA. No SIP requirement applies in attainment areas. The 1-hour nitrogen dioxide NAAQS was issued in 2010 and USEPA has not yet designated areas as attainment or nonattainment for 1-hour nitrogen dioxide. Hence, no SIP for 1-hour nitrogen dioxide applies to the study area or any downline area. USEPA determines attainment status based on air pollution measurements taken at fixed monitoring sites. If an area is remote from monitoring sites USEPA may determine that the available measurement data are insufficient to determine attainment status and may designate the area "unclassified." Because 1-hour nitrogen dioxide concentrations are of most concern in the immediate vicinity (e.g., less than 1 mile) of emission sources, but most existing monitors are sited to represent air quality conditions over larger areas (neighborhood to metropolitan size), USEPA has begun a program to expand the network of nitrogen oxide monitors, with emphasis on locations near high-volume roadways. To date no monitoring data pertaining to the study area is available from this program. USEPA treats unclassified areas as attainment areas. Based on the available monitoring data (see Section 4.4.2, *Ambient Air Quality*) USEPA likely will designate the study area as attainment or unclassified for the 1-hour nitrogen dioxide NAAQS, and accordingly no SIP requirements will apply to the study area. Stationary emission sources (e.g., industrial plants) must obtain air quality permits from the state air quality agency whether they are located in attainment or nonattainment areas. In order to be granted the permit the facility must demonstrate

Regulation	Explanation
	that its emissions will not cause or contribute to a violation of the NAAQS. There is no such permit requirement for mobile (transportation) sources such as locomotives.
State	
Montana Air Quality Standards (17 ARM 8.200)	Montana DEQ has jurisdiction over air quality and has established ambient air quality standards.
Montana Air Quality Permit Requirements (17 ARM 8.743)	Montana DEQ requires stationary sources that would have emissions greater than certain thresholds to obtain air quality permits. The proposed rail line would not be a stationary source and is not subject to the Montana DEQ permit process.
Local	
No local air quality regulations or plans would directly or indirectly affect rail line construction or operation.	

Notes:

[a] OEA used these thresholds for consistency with BLM studies that provided information used in the impact analysis (see Appendix U, *Cumulative Impacts*). However, USFS recommended threshold levels have changed since publication of the BLM studies.

[b] An equivalent is a measure of a substance's ability to combine with other substances. The equivalent is formally defined as the amount of a substance, in moles, that will react with one mole of electrons. A microequivalent is 1 millionth of an equivalent.

U.S.C. = United States Code; NEPA = National Environmental Protection Act; C.F.R. = Code of Federal Regulations; STB = Surface Transportation Board; OEA = Office of Environmental Analysis; USEPA = U.S. Environmental Protection Agency; NAAQS = National Ambient Air Quality Standards; CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; PM10 = particulate matter 10 microns or less in diameter; PM2.5 = particulate matter 2.5 microns or less in diameter; SO_2 = sulfur dioxide; HAP = hazardous air pollutant; MSAT = mobile source air toxic; SIP = state implementation plan; DEQ = Montana Department of Environmental Quality; PSD = prevention of significant deterioration; SO_X = sulfur oxides, NO_X = nitrogen oxides; VOC = volatile organic compound; CAA = Clean Air Act; FIP = federal implementation plan; Fed. Reg. = *Federal Register*); kg/ha-yr = kilograms per hectare per year; µeq/l = micro-equivalents per liter; ARM = Administrative Rules of Montana; SIP = state implementation plan